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☐ 1. Document ID: US 6351302 B1

L1: Entry 1 of 6

File: USPT

Feb 26, 2002

US-PAT-NO: 6351302

DOCUMENT-IDENTIFIER: US 6351302 B1

TITLE: Analog sound track digitizer

DATE-ISSUED: February 26, 2002

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Carlsen, II; George D.	Cardiff	CA	92007	
Vale; Ronald W	San Diego	CA	92103	

APPL-NO: 09/ 569145 [PALM]

DATE FILED: May 11, 2000

INT-CL: [07] G03 B 31/02, G11 B 7/00

US-CL-ISSUED: 352/26; 352/37, 369/125

US-CL-CURRENT: 352/26; 352/37, 369/125

FIELD-OF-SEARCH: 352/6, 352/10, 352/26, 352/29, 352/1, 352/5, 352/11, 352/27, 352/37, 369/124, 369/125, 371/36, 371/37.9, 371/64

PRIOR-ART-DISCLOSED:

U.S. PATENT DOCUMENTS

PAT-NO	ISSUE-DATE	PATENTEE-NAME	US-CL
<u>3915566</u>	October 1975	Fisher	352/10
<u>3964826</u>	June 1976	Joseph et al.	352/10
<u>4085296</u>	April 1978	Keegan	179/100.3
<u>4124784</u>	November 1978	Johnson et al.	179/100.3
<u>4355383</u>	October 1982	Dolby	369/120
<u>4577302</u>	March 1986	Allen	369/46
<u>4596008</u>	June 1986	Beard	369/107
<u>4599715</u>	July 1986	Beard	369/124
<u>4734903</u>	March 1988	Shirai et al.	369/107
<u>5231627</u>	July 1993	Paul et al.	369/125

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<u>5237559</u>	August 1993	Murphy et al.	369/125
<u>5483306</u>	January 1996	Rodriguez	354/10
<u>5526075</u>	June 1996	Carlsen	352/26
<u>5543868</u>	August 1996	Tachi	352/27
<u>5621490</u>	April 1997	Davis	352/79
<u>5710752</u>	January 1998	Seagrave et al.	369/97

ART-UNIT: 2851

PRIMARY-EXAMINER: Adams; Russell

ASSISTANT-EXAMINER: Fuller; Rodney

ATTY-AGENT-FIRM: Logan II; Charles C.

## ABSTRACT:

The system eliminates the noise, rumble and hiss from any standard 35 mm analog optical sound track. By simply feeding the film through the projector sound head in a normal manner the system automatically converts the analog optical sound tracks to digital quality. No special storing of digital data on film is required and no special digital decoder equipment is needed. The system produces noise-free sound, increased frequency response, expanded dynamic range and clarity of the dialogue. Film studios will no longer need to carry a double inventory of films having digital and analog sound tracks or to process the sound tracks for noise reduction.

12 Claims, 9 Drawing figures

Full	Title	Citation	Front	Review	Classification	Date	Reference	Sequences	Attachments	Claims	KIMC	Draw Da
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☐ 2. Document ID: US 5870480 A

L1: Entry 2 of 6

File: USPT

Feb 9, 1999

US-PAT-NO: 5870480

DOCUMENT-IDENTIFIER: US 5870480 A

TITLE: Multichannel active matrix encoder and decoder with maximum lateral separation

DATE-ISSUED: February 9, 1999

## INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Griesinger; David	Cambridge	MA		

## ASSIGNEE-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY	TYPE CODE
Lexicon	Bedford	MA			02

APPL-NO: 08/ 742460 [PALM]

DATE FILED: November 1, 1996

h e b b g e e f e b e ch e

## PARENT-CASE:

CROSS-REFERENCE TO RELATED APPLICATIONS This application is a continuation-in-part of U.S. patent application Ser. No. 08/684,948, entitled "Multichannel Active Matrix Sound Reproduction with Maximum Lateral Separation," filed Jul. 19, 1996, now U.S. Pat. No. 5,796,844.

INT-CL: [06] H04 R 5/00

US-CL-ISSUED: 381/18; 381/22, 381/23

US-CL-CURRENT: 381/18; 381/22, 381/23

FIELD-OF-SEARCH: 381/18, 381/19, 381/20, 381/21, 381/22, 381/23

PRIOR-ART-DISCLOSED:

## U.S. PATENT DOCUMENTS

PAT-NO	ISSUE-DATE	PATENTEE-NAME	US-CL
<u>3772479</u>	November 1973	Hilbert	
<u>3786193</u>	January 1974	Tsurushima	
<u>3798373</u>	March 1974	Bauer	
<u>3812295</u>	May 1974	Bauer	
<u>3825684</u>	July 1974	Ite	
<u>3829615</u>	August 1974	Hiramatsu	
<u>3836715</u>	September 1974	Ite	
<u>3934086</u>	January 1976	Takahashi	
<u>3944735</u>	March 1976	Willcocks	
<u>3959590</u>	May 1976	Scheiber	
<u>4027101</u>	May 1977	DeFreitas	
<u>4074083</u>	February 1978	Berkovitz	
<u>4135203</u>	January 1979	Friedman	
<u>4236039</u>	November 1980	Cooper	
<u>4361727</u>	November 1982	Franssen et al.	
<u>4618987</u>	October 1986	Steinke	
<u>4649564</u>	March 1987	Barnett	
<u>4704728</u>	November 1987	Scheiber	
<u>4862502</u>	August 1989	Griesinger	
<u>4891839</u>	January 1990	Scheiber	
<u>4955057</u>	September 1990	Tominari	
<u>5029216</u>	July 1991	Jhabvala et al.	
<u>5109419</u>	April 1992	Griesinger	
<u>5136650</u>	August 1992	Griesinger	
<u>5161197</u>	November 1992	Griesinger	

## FOREIGN PATENT DOCUMENTS

FOREIGN-PAT-NO	PUBN-DATE	COUNTRY	US-CL
335468	October 1989	EP	

1112233	May 1968	DE
138267	October 1979	DE
138266	October 1989	DE
0050200	March 1982	JP
WO8909465	October 1989	WO

## OTHER PUBLICATIONS

Julstrom, "A High Performance Surround Sound Process For Home Video", J. Audio Eng. Soc., vol. 35, No. 7/8, 1987, pp. 536-549.

Griesinger, David, "Practical Processors and Programs for Digital Reverberation. AES 7th International Conference", Mar., 1989, pp. 187-195.

Krokstad, Asbjern, "Electroacoustic Means of Controlling Auditorium Acoustics", Sep. 1985, pp. 1-18.

Ahnert, Wolfgang, "The Complex Simulation of Acoustical Sound Fields by the Delta Stereophony System DDS" 2418 (D-16), Nov. 1986, pp. 1-26.

Berkhout, A.J., "A Holographic Approach to Acoustic Control, J. Audio Eng. Soc.", vol. 36, No. 12, Dec., 1988.

ART-UNIT: 273

PRIMARY-EXAMINER: Isen; Forester W.

ATTY-AGENT-FIRM: Haynes and Boone, L. L. P.

## ABSTRACT:

A sound reproduction system for converting stereo signals on two input channels, which may have been directionally encoded from a four or five channel original using a phase/amplitude film matrix encoder, such signals including at least one component which is directionally encoded through a phase and amplitude encoding device and at least one component that is not directionally encoded but is different in the two input channels, into signals for multiple output channels, for example center, front left, front right, side left, side right, rear left, and rear right, including decoding apparatus for enhancing the directionally encoded component of the input signals in the desired direction and reducing the strength of such signals in channels not associated with the encoded direction, while preserving both the maximum separation between the respective left and right channels and the total energy of the non-directionally encoded component of the input channels in each output channel, such that the instruments recorded on the right input channel stay on the right side of the output channels and the instruments recorded on the left stay on the left side, and the apparent loudness of all the instruments in all the output channels stays the same regardless of the direction of the directionally encoded component of the input signals; and further including circuits to improve separation in the decoder for uncorrelated left and right side inputs, to improve reproduction of apparent motion between the sides and the rear, to compensate for boost applied to signals in the front quarter of the sound field, and to limit the maximum excursion of each of the direction control signals when the other is changing.

10 Claims, 20 Drawing figures

Full	Title	Citation	Front	Review	Classification	Date	Reference	Sequences	Attachments	Claims	KMC	Draw D
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☐ 3. Document ID: US 5796844 A

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L1: Entry 3 of 6

File: USPT

Aug 18, 1998

US-PAT-NO: 5796844

DOCUMENT-IDENTIFIER: US 5796844 A

TITLE: Multichannel active matrix sound reproduction with maximum lateral separation

DATE-ISSUED: August 18, 1998

## INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Griesinger; David H.	Cambridge	MA		

## ASSIGNEE-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY	TYPE CODE
Lexicon	Bedford	MA			02

APPL-NO: 08/ 684948 [PALM]

DATE FILED: July 19, 1996

INT-CL: [06] H04 S 3/00

US-CL-ISSUED: 381/18; 381/22, 381/23

US-CL-CURRENT: 381/18; 381/22, 381/23

FIELD-OF-SEARCH: 381/18, 381/19, 381/20, 381/21, 381/22, 381/23

PRIOR-ART-DISCLOSED:

## U.S. PATENT DOCUMENTS

PAT-NO	ISSUE-DATE	PATENTEE-NAME	US-CL
<u>3626365</u>	December 1971	Press	
<u>3772479</u>	November 1973	Hilbert	
<u>3786193</u>	January 1974	Tsurushima	
<u>3798373</u>	March 1974	Bauer	
<u>3812295</u>	May 1974	Bauer	
<u>3825684</u>	July 1974	Ite	
<u>3829615</u>	August 1974	Hiramatsu	
<u>3836715</u>	September 1974	Ite	
<u>3934086</u>	January 1976	Takahashi	
<u>3944735</u>	March 1976	Willcocks	
<u>3959590</u>	May 1976	Scheiber	
<u>4027101</u>	May 1977	DeFreitas	
<u>4074083</u>	February 1978	Berkovitz	
<u>4135203</u>	January 1979	Friedman	
<u>4236039</u>	November 1980	Cooper	
<u>4361727</u>	November 1982	Franssen et al.	
<u>4618987</u>	October 1986	Steinke	

<u>4649564</u>	March 1987	Barnett
<u>4704728</u>	November 1987	Scheiber
<u>4862502</u>	August 1989	Griesinger
<u>4891839</u>	January 1990	Scheiber
<u>4955057</u>	September 1990	Tominari
<u>5029216</u>	July 1991	Jhabvala et al.
<u>5109419</u>	April 1992	Griesinger
<u>5136650</u>	August 1992	Griesinger
<u>5161197</u>	November 1992	Griesinger

## FOREIGN PATENT DOCUMENTS

FOREIGN-PAT-NO	PUBN-DATE	COUNTRY	US-CL
335468	October 1989	EP	
1112233	May 1968	DE	
138267	October 1979	DE	
138266	October 1989	DE	
0050200	March 1982	JP	
WO8909465	October 1989	WO	

## OTHER PUBLICATIONS

Julstrom, "A High Performance Surround Sound Process For Home Video", J. Audio. Eng. Soc., vol. 35, No. 7/8, 1987, pp. 536-549.

Griesinger, David, "Practical Processors and Programs for Digital Reverberation. AES 7th International Conference", Mar., 1989, pp. 187-195.

Krokstad, Asbjern, "Electroacoustic Means of Controlling Auditorium Acoustics", Sep. 1985, pp. 1-18.

Ahnert, Wolfgang, "The Complex Simulation of Acoustical Sound Fields by the Delta Stereophony System DDS" 2418 (D-16), Nov. 1986, pp. 1-26.

Berkhout, A.J., "A Holographic Approach to Acoustic Control, J. Audio Eng. Soc.", vol. 36, No. 12, Dec., 1988.

ART-UNIT: 273

PRIMARY-EXAMINER: Isen; Forester W.

ATTY-AGENT-FIRM: Haynes and Boone, L.L.P.

## ABSTRACT:

A sound reproduction system for converting stereo signals on two input channels, which may have been directionally encoded from a four or five channel original using a phase/amplitude film matrix encoder, such signals including at least one component which is directionally encoded through a phase and amplitude encoding device and at least one component that is not directionally encoded but is different in the two input channels, into signals for multiple output channels, for example center, front left, front right, side left, side right, rear left, and rear right, including decoding apparatus for enhancing the directionally encoded component of the input signals in the desired direction and reducing the strength of such signals in channels not associated with the encoded direction, while preserving both the maximum separation between the respective left and right channels and the total energy of the non-directionally encoded component of the

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input channels in each output channel, such that the instruments recorded on the right input channel stay on the right side of the output channels and the instruments recorded on the left stay on the left side, and the apparent loudness of all the instruments in all the output channels stays the same regardless of the direction of the directionally encoded component of the input signals.

24 Claims, 15 Drawing figures

Full	Title	Citation	Front	Review	Classification	Date	Reference	Sequence	Attachments	Claims	KIMC	Draw Da
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☐ 4. Document ID: US 5526075 A

L1: Entry 4 of 6

File: USPT

Jun 11, 1996

US-PAT-NO: 5526075

DOCUMENT-IDENTIFIER: US 5526075 A

TITLE: Apparatus for reading analog sound tracks on film with circuit for averaging sound track boundaries to reduce the effect of noise

DATE-ISSUED: June 11, 1996

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Carlsen, II; George D.	Cardiff	CA		

ASSIGNEE-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY	TYPE	CODE
Digital Technology Systems of California, Inc.	Solana Beach	CA			02	

APPL-NO: 08/ 192365 [PALM]

DATE FILED: February 7, 1994

PARENT-CASE:

This application is a continuation-in-part of U.S. Pat. applications Ser. Nos. 08/119,646, filed Sep. 13, 1993, now abandoned, and 08/154,878 filed Nov. 19, 1993, now abandoned both of which applications were filed in the name of the present Applicant. This application claims priority from each of the above-referenced applications and incorporates by reference each of the above-referenced applications.

INT-CL: [06] G03 B 31/02, G11 B 7/00

US-CL-ISSUED: 352/26; 352/37, 369/125

US-CL-CURRENT: 352/26; 352/37, 369/125

FIELD-OF-SEARCH: 352/1, 352/5, 352/11, 352/26, 352/27, 352/29, 352/37, 369/124, 369/125, 371/36, 371/37.9, 371/64

PRIOR-ART-DISCLOSED:

U.S. PATENT DOCUMENTS

h e b b g e e e f e b e ch e

PAT-NO	ISSUE-DATE	PATENTEE-NAME	US-CL
<u>3915566</u>	October 1975	Fisher	352/10
<u>3964826</u>	June 1976	Joseph et al.	352/10
<u>3973839</u>	August 1976	Stumpf et al.	352/5
<u>4027958</u>	June 1977	Shigeta et al.	353/26A
<u>4085296</u>	April 1978	Keegan	369/112
<u>4124784</u>	November 1978	Johnson et al.	369/89
<u>4181433</u>	January 1980	Marcuse	356/73.1
<u>4215920</u>	August 1980	Butler	352/92
<u>4355383</u>	October 1982	Dolby	369/120
<u>4491399</u>	January 1985	Bell	352/92
<u>4577302</u>	March 1986	Allen	369/46
<u>4600280</u>	July 1986	Clark	352/37
<u>4603099</u>	July 1986	Drexler	430/140
<u>4691112</u>	September 1987	Wydler	250/570
<u>4758485</u>	July 1988	Drexler	430/12
<u>4827125</u>	May 1989	Goldstein	250/234
<u>4962432</u>	October 1990	Ohtsuka et al.	358/302
<u>5101096</u>	March 1992	Ohyama et al.	235/436
<u>5152295</u>	October 1992	Kobayashi et al.	128/665
<u>5164574</u>	November 1992	Ujiie et al.	235/462
<u>5212583</u>	May 1993	Vali et al.	359/245
<u>5231627</u>	July 1993	Paul et al.	369/125

ART-UNIT: 211

PRIMARY-EXAMINER: Gellner; Michael L.

ASSISTANT-EXAMINER: Lee; Eddie C.

ATTY-AGENT-FIRM: Rogitz; John L.

## ABSTRACT:

An analog-digitizer sound system for motion pictures that automatically converts both old and new analog stereo film-sound tracks to digital quality sound. The system eliminates the noise, rumble and hiss from any standard 35 mm analog optical sound track. By simply playing the film through the projector sound head in the normal manner the system automatically converts the analog optical sound tracks to digital format. No special storing of digital data on film is required and no special digital decoder equipment is needed. The system produces noise-free sound, increased frequency response, expanded dynamic range and clarity of dialogue. Film studios will no longer need to maintain a double inventory of digital and analog sound or process sound tracks for noise reduction.

1 Claims, 12 Drawing figures

Full	Title	Citation	Front	Review	Classification	Date	Reference	Sequences	Attachments	Claims	RMIC	Draw. De
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☐ 5. Document ID: US 5307415 A

L1: Entry 5 of 6

File: USPT

Apr 26, 1994

US-PAT-NO: 5307415

DOCUMENT-IDENTIFIER: US 5307415 A

TITLE: Surround processor with antiphase blending and panorama control circuitry

DATE-ISSUED: April 26, 1994

## INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Fosgate; James W.	Heber City	UT	84032	

APPL-NO: 07/ 967446 [PALM]

DATE FILED: October 28, 1992

## PARENT-CASE:

This is a divisional of co-pending application Ser. No. 07/533,091 filed on Jun. 8, 1990 now U.S. Pat. No. 5,172,415.

INT-CL: [05] H04R 5/00, H03G 3/00

US-CL-ISSUED: 381/22; 381/27, 381/28, 381/61

US-CL-CURRENT: 381/22; 381/27, 381/28, 381/61

FIELD-OF-SEARCH: 381/22, 381/27, 381/28, 381/61, 381/71

## PRIOR-ART-DISCLOSED:

## U.S. PATENT DOCUMENTS

PAT-NO	ISSUE-DATE	PATENTEE-NAME	US-CL
3632886	January 1972	Scheiber	
<u>3708631</u>	January 1973	Bauer et al.	
<u>3746792</u>	July 1973	Scheiber	
<u>3836715</u>	September 1974	Ito et al.	
<u>3864516</u>	February 1975	Kameoka et al.	
<u>3883692</u>	May 1975	Tsurushima	
<u>3883832</u>	May 1975	Fosgate	
<u>3885099</u>	May 1975	Tsurushima et al.	
<u>3943287</u>	March 1976	Gravereaux et al.	
<u>3944735</u>	March 1976	Willcocks	
<u>3959590</u>	May 1976	Scheiber	
<u>4704728</u>	November 1987	Scheiber	
<u>4891839</u>	January 1990	Scheiber	
<u>4932059</u>	June 1990	Fosgate	

ART-UNIT: 261

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PRIMARY-EXAMINER: Dwyer; James L.

ASSISTANT-EXAMINER: Chiang; Jack

ATTY-AGENT-FIRM: McCombs; David L.

## ABSTRACT:

A surround processor includes a time constant processing circuit for smoothing directional information signals from a detector with continuously variable time constants in order to generate one or more control voltage signals. The time constants produced by the circuit are continuously variable and responsive to both the rate of change and the amplitude of the directional information signals, such that as the difference between the controlled voltage signals and the directional information signals increases, the value of the time constants decreases to permit the control voltage signals to closely follow the directional information signals, and as the difference between the control voltage signals and the directional information signals decreases, the value of the time constants increases so that variations in the control voltage signals are smooth. Split-band processing of input audio signals to the processor is also accomplished without the necessity of placing filters directly in the audio path. A low-pass filter is utilized to separate out the low-frequency components of the input signals, and signal-dependent processing occurs with respect to the mid- and upper-frequency components only. Other improvements are also incorporated into the surround processor to optimize its performance.

11 Claims, 19 Drawing figures

Full	Title	Citation	Front	Review	Classification	Date	Reference	Drawings	Attachments	Claims	Index	Draw De
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☐ 6. Document ID: US 5172415 A

L1: Entry 6 of 6

File: USPT

Dec 15, 1992

US-PAT-NO: 5172415

DOCUMENT-IDENTIFIER: US 5172415 A

**\*\* See image for Certificate of Correction \*\***

TITLE: Surround processor

DATE-ISSUED: December 15, 1992

## INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Fosgate; James W.	Heber City	UT	84032	

APPL-NO: 07/ 533091 [PALM]

DATE FILED: June 8, 1990

INT-CL: [05] H04R 5/00, H03G 3/00

US-CL-ISSUED: 381/22; 381/63

US-CL-CURRENT: 381/22; 381/63

FIELD-OF-SEARCH: 381/22, 381/27, 381/28, 381/61, 381/71

PRIOR-ART-DISCLOSED:

## U.S. PATENT DOCUMENTS

PAT-NO	ISSUE-DATE	PATENTEE-NAME	US-CL
<u>3632886</u>	January 1972	Scheiber	
<u>3708631</u>	January 1973	Bauer et al.	
<u>3746792</u>	July 1973	Scheiber	
<u>3836715</u>	September 1974	Ito et al.	
<u>3864516</u>	February 1975	Kameoka et al.	
<u>3883692</u>	May 1975	Tsurushima	
<u>3883832</u>	May 1975	Fosgate	
<u>3885099</u>	May 1975	Tsurushima	381/22
<u>3943287</u>	March 1976	Gravereaux et al.	
<u>3944735</u>	March 1976	Willcocks	
<u>3959590</u>	May 1976	Scheiber	
<u>4704728</u>	November 1987	Scheiber	
<u>4891839</u>	January 1990	Scheiber	
<u>4932059</u>	June 1990	Fosgate	381/22

ART-UNIT: 261

PRIMARY-EXAMINER: Dwyer; James L.

ASSISTANT-EXAMINER: Chiang; Jack

ATTY-AGENT-FIRM: McCombs; David L.

## ABSTRACT:

A surround processor includes a time constant processing circuit for smoothing directional information signals from a detector with continuously variable time constants in order to generate one or more control voltage signals. The time constants produced by the circuit are continuously variable and responsive to both the rate of change and the amplitude of the directional information signals, such that as the difference between the controlled voltage signals and the directional information signals increases, the value of the time constants decreases to permit the control voltage signals to closely follow the directional information signals, and as the difference between the control voltage signals and the directional information signals decreases, the value of the time constants increases so that variations in the control voltage signals are smooth. Split-band processing of input audio signals to the processor is also accomplished without the necessity of placing filters directly in the audio path. A low-pass filter is utilized to separate out the low-frequency components of the input signals, and signal-dependent processing occurs with respect to the mid- and upper-frequency components only. Other improvements are also incorporated into the surround processor to optimize its performance.

27 Claims, 19 Drawing figures

Full	Title	Citation	Front	Review	Classification	Date	Reference	Sequences	Attachments	Claims	RMMC	Draw De
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Terms	Documents
(surround adj sound) and (separat\$3 near2 steer\$3)	6

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